

Claims

1. An information input and output method by use of a dot pattern characterized in that,

on a medium surface of a printed material etc., a plurality of lattice dots (4) are disposed in a rectangular shape and set as a block, and

the blocks are regularly and continuously disposed, and

such a dot that 1 piece of the lattice dots (4) which exists in the block was disposed by being shifted unidirectionally is set as a key dot (2), and

by setting said key dot (2) as a representative point, they are disposed at a circumference of the key dot (2), and by setting a center which was surrounded by the lattice dots (4) of 4 points as a hypothetical point, and by setting this as a start point, at an end point which was represented by a vector, a plurality of information dots (3) which have various information recognized are arranged in accordance with a predetermined rule by a dot code generation algorithm to thereby generate a dot pattern (1), and

a block which configures said dot pattern (1) is imported as image data by a camera, and, from a numerical value which was calculated by digitizing this, information, a program are outputted.

2. An information input and output method by use of a dot pattern of Claim 1, characterized in that, by said camera, recognized is a direction of the key dot (2) of said dot pattern (1), and on the basis of that direction, a dot which was disposed

at the end point is set as the information dot (3).

3. An information input and output method by use of a dot pattern of Claim 1, characterized in that a plurality of said information dots (3) are displayed around the hypothetical point of said lattice dot (4) as a center.

4. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

in case that data which is defined in said information dot (3) was bit-displayed, for use in an error check, by giving redundancy to 1 bit, out of 1 piece of said information dots (3), and by treating a high bit of data which is obtained from an information dot (I_n) and a low bit of data which is obtained from an information dot I_{n+1} as identical,

in such a state that said information dot (3) was displayed on said medium surface, when a high bit of data which is obtained from its information dot (I_n) and a low bit of data which is obtained from an information dot (I_{n+1}) are not identical, it is judged that said information dot (3) is not displayed at an appropriate position.

5. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

by assigning "0" or "1" to a low bit, in such a state that the information dot (3) was displayed on the medium surface, when there is misalignment from a position where the information dot (3) is disposed, to a position where disposed is an information dot (3) which is adjacent and has another data, it is judged that the information dot (3) is not displayed at an appropriate

position.

6. An information input and output method by use of a dot pattern of Claim 5, characterized in that,

assuming that a direction of said key dot (2) is defined as a upward direction, and data which is defined in an information dot (3) of that direction is "0", by disposing said information dot (3) in any one of equally spaced 8 directions, and assigning "0" to a low bit in order to carry out an error check,

in such a state that said information dot (3) was displayed on said medium surface, when the information dot (3) is located in an inclined direction other than up and down or left and right directions around the hypothetical point as a center, it is judged that the information dot (3) is not displayed at an appropriate position.

7. An information input and output method by use of a dot pattern of Claim 5, characterized in that,

assuming that a direction of said key dot (2) is defined as a upward direction, and data which is defined in an information dot (3) of that direction is "0", by disposing the information dot (3) in any one of equally spaced 8 directions, and assigning "1" to a low bit in order to carry out an error check,

in such a state that said information dot (3) was displayed on said medium surface, when the information dot (3) is located in up and down or left and right directions other than an inclined direction around the hypothetical point as a center, it is judged that the information dot (3) is not displayed at an appropriate position.

8. An information input and output method by use of a dot pattern of Claim 5, characterized in that,

in order to carry out an error check of said information dot (3) and to dispose the information dots (3) all around, assigned are "0" and "1" to a low bit alternately.

9. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

in order to encrypt data K_n which was defined in the information dot I_n of said dot pattern (1) so as to make it impossible to be read visually,

performed is an arithmetic operation which was represented by the function f to the data K_n , and

$I_n = f(K_n)$ is represented by the dot pattern (1), and

said dot pattern (1) is imported as image data by a camera, and said data K_n is calculated by $K_n = f^{-1}(I_n)$.

10. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

in order to eliminate regularity of said dot pattern (1) so as to make it impossible to visually read data of said information dot (3),

a difference component of adjacent 2 lines of information dots (3) is set as data which is defined in the information dot (3), and

by the information dot I_n which is calculated by adding the defined data K_n to a front line information dot I_m among the adjacent ones, the dot pattern (1) is generated and disposed.

11. An information input and output method by use of a

dot pattern of Claim 1, characterized in that,

in order to define a region with no information in said dot pattern (1), or in order not to import different data in respective regions separated by a border,

as a dummy dot (5) in which data is not defined, disposed is a dot at a central position of the lattice dots (4) of 4 points.

12. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

when said dot pattern (1) is imported as its image data by a camera,

after calculated were X, Y coordinate values at a position of the key dot (2) which is a representative point of information,

by supplementing coordinate values by a direction of the dot pattern (1) which is obtained from the key dot (2) increment values of the X, Y coordinate values at an adjacent representative point and a distance from an image pickup center to the key dot (2) whose X, Y coordinate values were calculated,

the X, Y coordinate values at the image pickup center are calculated.

13. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

when a block of said dot pattern (1) is imported as its image data by a camera, in such a region that identical data is defined in each block or such a region that X, Y coordinate values are defined,

by starting to read from the information dot (3) which is located at a circumference around the image pickup center of said

camera, reading the information dot (3) sequentially, and

reading the information dot (3) which corresponds to one block portion, the dot pattern (1) is read at a minimum area from the image pickup center of said camera, and data at the image pickup center position is calculated.

14. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

when said dot pattern (1) is read as image data by a camera, on the occasion that there occurs a partial error as to the information dot (3), read is an information dot (3) which corresponds to the above-mentioned information dot (3) and is the closest, and an error correction is carried out.

15. An information input and output method by use of a dot pattern of Claim 1, characterized in that,

said block is divided into sub-blocks, and individually independent information is given to each sub-block, and thereby,

the dot pattern (1) is read at a smaller area than said block unit, from the image pickup center of said camera, and also, with respect to each sub-block, an error check and an error correction are carried out.